

KICKDOWN CATAMARAN WITH RELIEF TRACKING RUDDER

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BACKGROUND

Field of the Invention

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This invention relates to catamarans, and more specifically to a catamaran characterized by facile assembly and kick down by hand and employing an underwater relief-tolerant rudder.

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Prior Art

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It is well known to have catamarans comprising a pair of parallel hulls, a mast supported by a main spar between the hulls, and platform between the hulls on which to ride. It is also well-known to have retractable rudders on sailboat sterns operated by a tiller that avoids damage to the rudder when it might impact an underwater object or change in underwater relief. It is also known to have retractable rudders that lift completely out of the water. For catamarans, it is also known to operate the tiller of each rudder from a common helmsman position.

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The present invention presents such a catamaran that can be assembled from components without tools using only hand-turned knobs and straps. Likewise, the catamaran can be broken down quickly and easily without tools for ease in assembly and disassembly for convenient transport of the vessel. Assembly can be easily done by one person, including raising and lowering the main mast with a sail attached. It also presents a rudder useful on each hull of such a catamaran that lifts and lowers to track underwater terrain or objects automatically but can be lifted completely out of the water by a single helmsman by simply pulling back on an arm linked to both tillers.

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## SUMMARY

Common to catamarans, this catamaran includes left and right hulls joined by a main spar and a stern spar. Threaded rods extending vertically from the hulls, two at each spar end to maintain the hulls aligned side by side, pass through matching holes in the spar ends. A hand knob on each spar end with a threaded hole matching the threaded rods secures the spars over the respective rods, hand tightened by the operator.

A bow spar doubles as a main sail lift line. A bow mast line is attached between the mast and the bow and two stern mast lines are attached between the mast and the stern spar, spaced apart. The mast with its main sail attached is therefore raised after the main and stern spars are secured onto the hulls simply by pulling the bow stern forward into place on the hull, typically under forward-facing hull hooks, the three lines then maintaining the mast vertical until the bow spar is released upon which it lowers the mast under control from vertical to horizontal

It is seen then that the catamaran is quickly and easily assembled and broken down by catch or release of the bow spar and hand tightening or untightening of the spar knobs without tools. With the spars removed from the catamaran, the components are amenable for facile loading and transport.

The mast that operationally rests with its end on the main spar is held in place by an easily removable cord. A slit in the mast at its proximal end receives the cord loop after it is wrapped around the main spar with a loop knot or other enlargement of the cord past the slit and inside of the mast. The cord then supports the mast alongside the main spar.

The cord typically is in a closed loop attaching the mast proximal end to the main spar by wrapping a lead portion of the loop from a main spar mast side around the main spar and

back to the main spar mast side passing through a tail portion of the loop and then  
2 through the mast slot, the lead portion of the loop being releasably fastened in the mast  
slot, securing the mast proximal end alongside the main spar. A ball on the lead portion  
4 of the loop larger than the mast slot then fastens the loop lead portion in the slot by  
passing the lead portion of the loop under the mast and upward into the slot, the loop  
6 passing through the slot from the ball on one slot side to the main spar on the opposite  
slot side.

8 A trampoline stretched between the main and stern spars provide a platform on which  
the operator sits. A plurality of adjustable straps extends from the trampoline toward the  
10 stern spar, adjustably connecting to matching strap fasteners on the stern spar. The  
trampoline is tightened between the main spar and the stern spar by adjusting the length  
12 of the plurality of stern spar straps

A stabilizing rod in a tube, along the straps on the trampoline stabilizes the  
14 trampoline by distributing the tension from tightened straps along the trampoline edge  
presented to the stern spar. At least two jib attachment straps are also sewed into the  
16 trampoline as a hold for a catamaran jib during sailing.

A rudder is mounted on each hull that traces the underwater relief or objects as they  
18 might impact the rudder distal end. The rudder rotates rearward on a horizontal axis  
about a pivot pin on a mounting plate as the catamaran moves forward as it impacts an  
20 underwater object. The mounting plate mounted to the hull itself hinges about a vertical  
axis to steer the vessel. A control plate is pivotally attached to the rudder near its top on  
22 one end, typically below and rearward of the rudder attachment to the mount plate, and  
rigidly to a tiller on its opposite end such that when the tiller is pulled it lifts the rudder

intermediate the rudder as the rudder upper end pivots about the horizontal axis at the  
2 rudder upper end. A tiller arm bridges between unattached ends of the tiller such that  
lateral movement of the tiller arm causes both rudders to pivot from the hinged  
4 attachment of the mount plate to the stern in steering the vessel.

The tiller comprises a first tube telescoping from a second tube and a spring in the  
6 second tube in stretched condition urging the first tube into the second tube. The spring  
tends to urge the rudder forward into the down position with the control plate in contact  
8 the mount plate. Yet when the rudder impacts on object, it rotates upward with the  
rudder distal end moving away from the stern as the first tube telescopes into the second  
10 tube against the spring bias.

The rudder is maintained in operational position as it rotates upward and downward  
12 through an inclined runner at the mount plate top that faces the stern. A guide on the  
tiller rests in a groove at the base of the runner when the rudder is vertical. As the rudder  
14 rotates away from its downward, operational position, the guide slides up the runner.

After the rudder passes the object it impacted that caused it to raise, the guide sliding  
16 down the runner into its rest position in the groove guides it back into vertical position.

When the rudder is lifted out of the water by the operator, the runner lifts past the runner  
18 as the tiller is pulled back and locked onto the hull until released, upon which the  
operator moves the guide once again against the runner to guide the rudder back into the  
20 water.

#### BRIEF DESCRIPTION OF THE DRAWINGS

22 FIG. 1 is a front perspective view of the assembled catamaran.

FIG. 2 is a rear perspective view of the catamaran partially assembled showing  
2 aligned hulls joined by main and stern spars.

FIG. 3 is an perspective view of threaded rods vertical from the hulls and matching  
4 knobs ready to receive a spar therebetween.

FIG. 4 is a perspective view of the trampoline stretched between the main spar and  
6 the stern spar by attaching straps.

FIG. 5 is a perspective of the trampoline attached to the stern by straps with a dowel  
8 in a trampoline loop for distributing load from the straps to the trampoline uniformly.

FIG. 6 is a perspective view of the partially assembled catamaran showing the mast  
10 partially raised by pulling of the bow spar forward toward engagement with forward  
facing hull hooks.

FIG. 7 is a perspective view of the mast alongside the main spar secured by a cord in  
12 a mast slot at its proximal end.

FIG. 8 is a side view of the rudder assembly showing the rudder in downward  
14 position.

FIG. 9 is a side view of the rudder assembly showing the rudder partially raised.  
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FIG. 10 is a side view of the rudder assembly showing the rudder raised out of the  
18 water by action of the tiller pulling the rudder up with the tiller engaged in forward facing  
hull hooks.

## 20 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The catamaran of the present invention is adapted for quick and easy kick up and kick  
22 down without tools. Characteristic to catamarans, it comprises left and right hulls 10 and

12 aligned side by side in parallel, a main sail (not shown) on a mast 18, a jib (not  
2 shown), and a rudder assembly 100.

A main spar 16 releasably connects the two hulls at the center of the hulls and a mast  
4 18 is removably attached thereto. A stern spar 20 also releasably connects the two hulls  
10 and 12 astern from the main spar 16. A trampoline 60 stretches between the main and  
6 stern spars 16 and 20 as a platform. The rudder assembly 100 attaches removably to each  
hull stern 22 with a tiller 24 extending from each rudder 102 toward the stern spar 20. A  
8 tiller arm 26, also removable without tools, interconnects the tillers 24 at their distal ends  
such that lateral movement of the tiller arm 26 causes the rudders 102 to move on their  
10 vertical axes 104. A bow spar 28 also releasably connects the two hulls 10 and 12 of the  
catamaran forward from the main spar 16. Stern lines 30 connect between each of the  
12 first and second hulls 10 and 12 sternward of the main spar 16 and the mast 18  
intermediate its length and spaced apart from the main spar 16. Similarly, a bow line 32  
14 connects between the mast 18 also intermediate its length and the bow spar 28 such that  
during catamaran assembly the bow spar 28 pulls the mast 18 attached to the main spar  
16 at its proximal end 40 from horizontal to vertical and then connects to the hulls on hull  
hooks 34 forward of the main spar 16. The three lines then maintain the mast 18 vertical  
18 until the bow spar 28 is released upon which it lowers the mast 18 under control from  
vertical to horizontal.

20 For facilitating attachment to the main spar 16, the mast 18 includes a mast vertical  
slot 42 on one mast side 38 opening at the mast proximal end 40, longitudinal with the  
22 mast 18. A cord 41, typically in a closed loop, attaches the mast proximal end 40 to the  
main spar 16 by wrapping a lead portion 44 of the loop from a main spar mast side 46

around the main spar 16 and back to the main spar mast side 46 passing through a tail  
2 portion 48 of the loop and then through the mast slot 42. As the mast 18 rests vertically  
alongside the main spar 16, the lead portion 44 of the loop is releasably fastens in the  
4 mast slot 42, securing the mast 18 alongside the main spar 16. A ball or knot 50 on the  
lead portion 44 of the loop larger than the mast slot 42 may be employed to fasten the  
6 loop lead portion 44 in the slot 42 by passing the lead portion 44 of the loop under the  
mast 18 and upward into the slot 42, the loop passing through the slot 42 with the ball 50  
8 on the slot side opposite the main spar 16.

The trampoline 60 is affixed to the main spar 16 and then stretched to the stern spar  
10 20 during catamaran assembly. A plurality of trampoline straps 72 extends from the  
trampoline rearward edge 74 and end in a fastener first part 76. A plurality of stern spar  
12 straps 78 extend from a stern spar forward edge 80 and end in a fastener second part 82,  
typically a strap buckle 82', through which the trampoline strap 72 passes, pulling the  
14 strap tight, and stretching the trampoline 60 between the main and stern spars 16 and 20,  
as it is secured in the buckle 82', the trampoline 60 tightened between the main spar 16  
16 and the stern spar 20 by adjusting the effective length of the plurality of stern spar straps  
78. To distribute tension from the plurality of straps across the trampoline rearward edge  
18 74, a trampoline tube 84 at the trampoline rearward edge 74 has a rod or dowel 86  
running through it. To receive a jib (not shown), at least one looped jib strap 88 is  
20 provided sewn into the trampoline 60 into which the jib can be quickly inserted and  
removed manually.

22 To attach the main spar 16 to the hulls 10 and 12, a first set of two threaded rods 90  
extend upward from each hull and matching holes 92 in the main spar ends 94 fit over the

rods 90. Main spar knobs 96 with threaded holes 98 that match the threaded rods 90 are  
2 hand-tightened removably to secure the spar thereon for quick kick up and down by hand.  
Similarly, to attach the stern spar 20 to the hulls 10 and 12, a second set of two threaded  
4 rods 90' extend upward from each hull and matching holes 92' in the stern spar ends 94'  
fit over the rods 90'. Stern spar knobs 96' also with threaded holes 98' that match the  
6 threaded rods 90' are hand-tightened to secure the spar thereon. It should be understood  
that this description of knob on a rod, in the specification and the claims, is meant to be  
8 construed liberally to include any other hand operated clamping or tightening means,  
such as a cam clamp, strap and buckle, fastener, eye and hook tape, rod and cotter pin,  
10 and other functionally similar or equivalent mechanisms or mechanisms achieving the  
same result.

12 The catamaran rudder assembly 100 comprises a common rudder 102 mounted on  
each hull 10 and 12 to pivot on a vertical axis 104 in steering the catamaran. The  
14 improvement comprises a mounted plate 106 mounted pivotally to each hull stern 22 on  
upper and lower vertical pins 108 and 108' as a hinge. The rudder 102 mounts to the  
16 mounting plate 106 pivotally about a first horizontal axis 110 enabling the rudder 102 to  
move between a lowered, or vertical, position 112 and raised position 114 with the rudder  
18 102 out of the water, or above the hull.

A control plate 116 attaches between a tiller 24 and the rudder 102. The tiller 24 is  
20 rigidly attached to the control plate 116 and the rudder 102 is pivotally attached about a  
second horizontal axis 120 at the rudder proximal, or upper, end 122. So that a pull by  
22 the tiller 24 raises the rudder 102, the first horizontal axis 110 is above and forward from  
the second horizontal axis 120 when the rudder 102 is in its lowered position 112. Thus,



an operator can rotate the rudder 102 up by pulling the tiller 118. A hook 124 is provided on the hull stern 122 directed away from the rudder 102 to which the tiller 24 may be secured to hold the rudder 102 in its raised position.

The rudder 102 is also free to rotate independent of operator action on the tiller 24 as it impacts an object or underwater relief in shallow waters causes the rudder 102 to rotate to avoid damage to it. In doing so, the rudder pivots on both first and second horizontal axes 110 and 120 raising the second horizontal axis 120 and the control plate 116 relative to the first horizontal axis 110 and the mounting plate 106. To accommodate rudder rotation, the tiller 24 comprises a tubular inner member 126 telescoping from a tubular outer member 128 with a spring 130 in the outer member 128 biasing the inner member 126 into the outer member, urging the rudder 102 to its lowered position and accepting rudder rotation as the inner member moves into the outer member against the spring bias.

The control plate 116 includes an interface surface 132 that engages the mounting plate 106 and stops downward rotation of the control plate 116 at the rudder lowered position.

To guide the rudder 102 as it rotates upon impact against its distal end, an inclined runner 138 is provided on the mounting plate 106 at its top 140 facing generally toward the stern 22. A guide 142 on the tiller 24 slides on the runner 138, resting in a groove 144 at the base 146 of the runner 138 when the rudder 102 is in its lowered position. As the rudder 102 rotates, it lifts the tiller 24 and the guide 142 slides on the runner 138. As the rudder 102 returns to its lowered position under bias of the spring 130, the guide 142 slides on the runner 138 back to the groove 144. If the rudder 102 rotates such that the guide 142 is lifted above the runner 138, either because the operator lifts the rudder 102

out of the water or because the underwater relief causes a large rudder rotation, the guide

2 142 is reset manually to the runner 138 by the operator.

Thus, the catamaran is amenable to facile knockdown. With the hulls 10 and 12 in  
4 parallel and side by side, the main spar 16 is placed in position between the two hulls  
over the threaded rods 70 central in the hulls and the knobs 96 are threaded over them by  
6 hand to secure the main spar in place. The stern spar 20 is then placed over the second  
set of two threaded rods 70' and knobs 96' likewise secure it in place. The trampoline 60  
8 is then extended as a platform from the main spar 16 toward the stern spar 20 and  
stretched tight in connecting the plurality of trampoline straps 72 to the plurality of  
10 buckles 82 on the stern spar 20.

The rudder assemblies are also installed on the hull sterns 22 by engaging aligned  
12 pins 108 extending vertically from the mount plate 106 through receiving holes 146 in  
brackets 148 in the hull sterns 22 with the tiller 24 directed from the rudder 102 toward  
14 the stern spar 20 and the tiller arm 26 connected between distal ends of the tiller 24.

Before raising the mast, it is tied to the main spar 16 with the mast 18 alongside the  
16 main spar 16 by wrapping the cord 41 around the main spar 16 and passing it through the  
slot 42. The mast 14 is then raised by pulling the bow spar 28 into position between hulls  
18 at the catamaran bow with attached bow lines, lifting the mast with main sail attached  
from horizontal to vertical and attaching the bow spar 28 to the bow 150 of each hull 10  
20 and 12 with the mast supported by cord 41 in the mast slot 42.